No Tipping Game

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Computer Science

Description

Given a uniform, flat board (made of a titanium alloy) 50 meters long and weighing 3 kilograms, consider it ranging from -25 meters to 25 meters. So the center of gravity is at 0. We place two supports of equal heights at positions -3 and -1 and a 3 kilogram block at position -4.

The No Tipping game is a two person game that works as follows: the two players each start with 15 blocks having weights 1 kg through 15 kg. The first player places one block anywhere on the board, then the second player places one block anywhere on the board, and play alternates with each player placing one block until the second player places his or her last block. (No player may place one block above another one, so each position will have at most one block.) If after any ply, the placement of a block causes the board to tip, then the player who did that ply loses. Suppose that the board hasn't tipped by the time the last block is placed. Then the players remove one block at a time in turns. At each ply, the first player may remove a block placed by any player. The second player may not remove any blocks placed by the first player unless those are the only blocks left. (In other words, the second player may remove only his or her own blocks or the original block unless the only blocks left are those of the first player.) If the board tips following a removal, then the player who removed the last block loses.

As the game proceeds, the net torque around each support is calculated and displayed. The blocks, whether on the board or in the possession of the players, are displayed with their weight values.

Architecture Team Spec

- The architecture team must implement the display as specified above, so must calculate the net torque after every block is placed or removed. The display should also announce that tipping has occurred when it does occur. The architecture group should enhance this implementation, ensure it works on netscape and internet explorer and present it on discussion night and implement a random strategy.

  You can see Prasad Tadimalla's implementation here.

- A Random Strategy should play the first or second player's game (depending on the command line). During AddMode, it should choose a random remaining block and place it as far left as possible so as to avoid tipping. During RemoveMode, it should examine all blocks on the board, determine which are will not cause tipping, and remove a random one of those. This should be a small challenge to defeat.